

Sea-spiders (Arthropoda: Pycnogonida) from Moreton Bay, Queensland

Roger N. BAMBER

Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.
Email: R.Bamber@nhm.ac.uk

Citation: Bamber, R. N. 2008 12 01. Sea-spiders (Arthropoda: Pycnogonida) from Moreton Bay, Queensland. In, Davie, P.J.F. & Phillips, J.A. (Eds), Proceedings of the Thirteenth International Marine Biological Workshop, The Marine Fauna and Flora of Moreton Bay, Queensland. *Memoirs of the Queensland Museum — Nature* 54(1): 131–142. Brisbane. ISSN 0079-8835.

ABSTRACT

Sampling of the littoral and sublittoral benthos around Moreton Bay, Queensland, Australia, undertaken in February 2005, revealed, *inter alia*, eighty pycnogonid specimens representing thirteen species from nine genera. Only eight of these species had been recorded previously from Australia, viz. *Achelia shepherdii*, *A. assimilis*, *Endeis flaccida*, *Ascorhynchus longicollis*, *Pseudopallene reflexa*, *Anoplodactylus cribellatus*, *A. tubiferus* and *Nymphon mollerii*. An *Ascorhynchus* species closest to the New Zealand species *A. insularum* (tentatively, based on a subadult), the Tanzanian species *Propallene ardua* and the allegedly Caribbean-Northeast Atlantic-Mediterranean species *Callipallene emaciata sensu stricto* are newly recorded for Australia, as are previously undescribed species of *Oropallene* and *Nymphon*. □ *Pycnogonida*, Queensland, Australia, *Achelia*, *Anoplodactylus*, *Ascorhynchus*, *Callipallene*, *Endeis*, *Nymphon*, *Oropallene*, *Propallene*, *Pseudopallene*.

Sampling of the littoral and sublittoral benthos around Moreton Bay, Queensland, Australia, was undertaken in February 2005 in order to characterise the smaller marine arthropod fauna of this region, including pycnogonids. In the event, although few pycnogonids were collected, they included two previously undescribed species, new records for Australia, or range extensions of under-recorded species.

Previous records of pycnogonids from eastern Australia are sporadic, predominantly reported by Clark (1963), who listed the earlier literature for Australia; Stock (1973a, b) recorded species from Victoria and South Australia; Staples (1979, 1982) reported on pycnogonids from Queensland (north of Brisbane), Victoria and South Australia, and subsequently (Staples 1997) collated the species from South Australia, with additional reporting on South Australian species in Staples (2004); Child (1990), and recently Lee & Arango (2003) and Arango (2003) reported on pycnogonids from the Great Barrier Reef, and the last reviewed all the previous Australian pycnogonid recording, while Child (1975) and Bamber (2005) reported on pycnogonids from Western Australia.

METHODS

Collecting methods were by hand (diving) and by various sampling gears, notably a standard 0.1m² van Veen grab and a spanner-crab dredge. Other sampling was opportunistic and non-quantitative. Position fixing was by GPS. All specimens were collected under Queensland Marine Parks Permit No. QS2005/CVL1057.

During the 2005 workshop, Peter Davie undertook a wider grab sampling survey south of Peel Island, in southern Moreton Bay. Material from these samples were kindly initially identified by Claudia Arango. Station details are given in Table 1; these samples are referred to in the text as 'MBWS Stn #'.

Specimens were sorted live to allow observation of colouration, then fixed in 100% ethanol or 75% methanol. Drawings were all done using a camera lucida. Measurements are axial (Fry & Hedgpeth 1969), dorsally on the trunk and laterally on the appendages. Voucher and type-material has been lodged in the collections of the Queensland Museum (QM) and The Natural History Museum, London (NHM). The higher taxonomy

Table 1. Station details for the MBWS survey of February 2005, south of Peel Island, Moreton Bay, Queensland.

Stn	Latitude	Longitude	Depth (m)	Date
1	27° 31.25'	153° 22.00'	5.7	17/02/2005
2	27° 31.25'	153° 21.85'	5.8	17/02/2005
3	27° 31.25'	153° 21.65'	5.6	18/02/2005
4	27° 31.53'	153° 21.44'	5.1	20/02/2005
5	27° 31.53'	153° 21.70'	5.7	20/02/2005
6	27° 31.55'	153° 20.80'	7.7	18/02/2005
7	27° 31.48'	153° 20.72'	8.2	18/02/2005
8	27° 31.48'	153° 20.48'	8.4	18/02/2005
10	27° 31.68'	153° 20.54'	7.6	18/02/2005
13	27° 31.98'	153° 20.62'	6.2	20/02/2005

is based on Arnaud & Bamber (1987) as modified by Bamber (2007).

Terminology: larvae are specimens without an open anus; juveniles are specimens without four fully developed pairs of legs; subadults are specimens with four fully developed pairs of legs but without fully developed ovigers (where these are present). Terminology of the cuticular ornamentation follows that of Bamber (2004).

SYSTEMATICS

Family AMMOTHEIDAE Dohrn, 1881

Achelia Hodge, 1864

Achelia shepherdii Stock, 1973

Achelia shepherdii Stock, 1973b, 92–95, figs 1, 2; Child, 1975, 22–24, fig. 10; Staples, 1997, 1066, fig. 21.7e.

Material Examined. QM-S73270, 2 ♀♀, 1 juv., on filamentous red algae, Point Lookout, 27°26.31'S 153°32.52'E, 10 m, 12.02.2005, A-N.L. QM-S73271, ovigerous ♂, 2 ♀♀, 2 juvs, on algae, Flat Rock, 27°23.5'S 153°33.0'E, 8–15 m, 17.02.2005, A-N.L. QM-S73272, ♀, 1 juv., in hydroids, Shag Rock, north of Point Lookout, North Stradbroke I., 27°24.8'S 153°31.5'E, 8 m, 18.02.2005, M. Preker. NHM.2006.335–337, ovigerous ♂, 2 ♀♀, amongst hydroids, Flat Rock, 27°23.5'S 153°33.0'E, 21 m, 22.02.2005, M. Preker.

Remarks. *Achelia shepherdii* is endemic to Australia, having been recorded from West Australia, Tasmania and Victoria, at depths from 0–50 m. The present records extend its known distribution northwards on the eastern Australian coast to

Queensland. The species is instantly recognisable owing to its bulbous, round proboscis and the exaggerated ventral apophyses on the last four palp articles, giving a serrated appearance to the distal half of the palp. The present material was collected subtidally from amongst hydroid or algal substrata from 8–21 m depth.

Achelia assimilis (Haswell, 1884)

Ammothea assimilis Haswell, 1884: 1026–1027, pl. LV, figs 5–9

Achelia assimilis — Stock, 1954, 97–100, figs 45–46; Arango, 2003, 2728–2730, fig. 2 (literature).

Material Examined. QM-S73273, ♂, ♀, 1 juv., in sponge and bryozoan epifauna, Point Lookout, 27°26.31'S 153°32.52'E, 10 m, 12.02.2005, A-N.L. QM-S73274, 2 subadults, 1 juv., amongst bryozoans, Amity Point Jetty, 27°23.9'S 153°26.2'E, 5m, 12.02.2005, M. Preker. QM-S73275, 2 subadults, within dead *Phoronis* tube-mat, Point Lookout, 27°26.31'S 153°32.52'E, 10 m, 12.02.2005, A-N.L. QM-S73276, ♂, ♀, 3 juvs, amongst hydroids and algae, Flat Rock, 27°23.5'S 153°33.0'E, 8–10 m, 17.02.2005, M. Preker. QM-S73277, ovigerous ♂, on algae (*Melanamansia glomerata*), QM-S73278, 1 subadult, on *Delisia pulchra*, Flat Rock, 27°23.5'S 153°33.0'E, 8–15 m, 17.02.2005, A-N.L. NHM.2006.338–342, ovigerous ♂, ♂, 2 ♀♀, 1 subadult, amongst hydroids, Flat Rock, 27°23.5'S 153°33.0'E, 21 m, 22.02.2005, M. Preker.

MBWS MATERIAL: QM-S85511, ♀, stn 6B; QM-S85510, ♀, stn 6D; QM-S85522, ♀, stn 6E; QM-S85503, ♀, stn 7A; QM-S85508, 2 ♂♂, ♀, stn 7B; QM-S85512, ♂, 2 ♀♀, stn 7E; QM-S85513, ♀, stn 8A; QM-S85523, 2 ♀♀, stn 8C; QM-S85515, ♀, stn 8D.

Remarks. This species has been recorded previously from Western Australia, New South Wales and Queensland, as well as from East Africa, South America and from New Zealand up to the Philippines (see Arango, 2003 for discussion). Much variation in its morphology has been described, and it is likely to be a species aggregate. The present material was collected subtidally from amongst epizoic or algal substrata at 5 to 21 m depth.

Family EURYCYDIDAE Sars, 1891

Ascorhynchus Sars, 1877

Ascorhynchus aff. *insularum* Clark, 1971

(Fig. 1)

Ascorhynchus insularum Clark, 1971, 335–336, fig. 2A–L.

Material Examined. QM-S73279, subadult, amongst *Halophila decipiens* on slightly anoxic sand, NE of Chain Banks, 27°24.58'S 153°21.75'E, 7.7–8.5 m, 35‰, 29.4°C, spanner crab dredge, RNB.

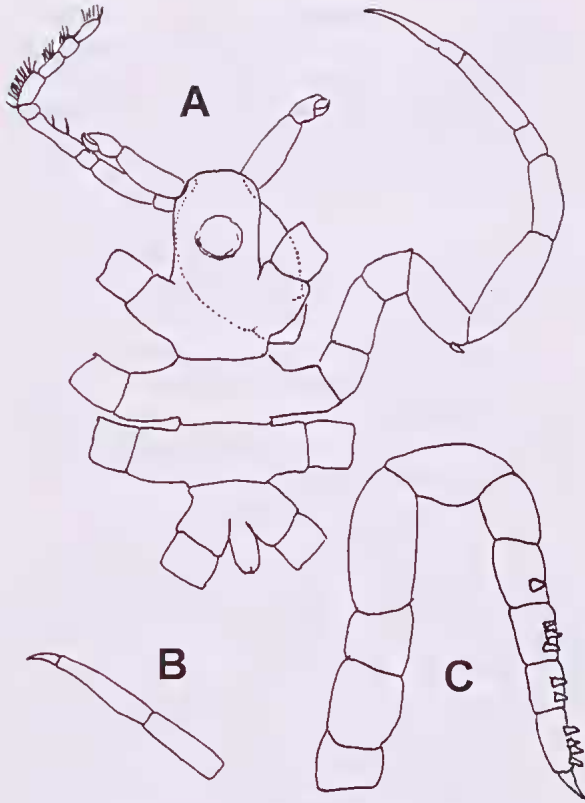


FIG. 1. *Ascorhynchus* aff. *insularum* Clark, 1971, Moreton Bay subadult: A, trunk and second right leg, dorsal; B, detail of distal articles of first right leg; C, left oviger. Scale bar = 0.6 mm for A, B, 0.3 mm for C.

Description. Tiny, trunk length 1.25 mm; trunk (Fig. 1A) fully segmented, glabrous; cephalon half length of trunk, dome-like ocular tubercle in anterior half. No dorsal tubercles on trunk midline, lateral processes or cephalon.

Proboscis fusiform, widest centrally, with slight distal constriction. Chelifore scape of one article; chelae chelate. Palp of ten articles, third and fifth articles (P3 and P5) subequal, longest; P6 half length of P7; P7 to P10 subequal, with ventral setae, restricted to distal half on last three articles. Oviger (Fig. 1C) compact, probably immature; fourth article (O4) longest; compound spines on distal; four articles (1:3:3:5); terminal claw half length of O10, simple.

Second leg (Fig. 1A) almost naked, femur with short, stout dorsodistal spine; tarsus one third as long as propodus; main claw slightly longer than propodus. First leg with reduced main

claw, one-quarter as long as propodus; tarsus not apparent (Fig. 1B).

Remarks. this specimen is a subadult, with fully segmented trunk and all articles present in legs, palps and ovigers; the chelae are still chelate, but compound and terminal spines are present on the oviger. At this stage, most gross adult features of morphology are expressed.

The only described species of *Ascorhynchus* with a tarsus much shorter than half the length of the propodus (brevitarsal), a single-articled chelifore scape, and no dorsal trunk, lateral process or cephalon tubercles are *A. areuicola* (Dohrn, 1881) known only from the Mediterranean near Naples; *A. mariae* Turpaeva, 1971, known only from the Kurile-Kamchatka Trench, NW Pacific, at depths greater than 3000 m; and *A. insularum*, recorded from the littoral zone of the Snares Islands, near New Zealand (Clark, 1971).

In the morphology of the cephalon and of the proboscis, the proximity of the lateral processes, and in particular the proportions of the palp articles, this specimen appears closest to an early subadult of the small species *A. insularum* (trunk length of holotype 3.1 mm). However, the lack of spines and setae on the trunk and legs, other than the short, stout dorsodistal spine on the femur, the lack of a swollen ventral extension of the cephalon at the attachment of the ovigers, and the proportions of the leg articles are inconsistent with that species. An adult specimen is needed for confirmation.

Ascorhynchus longicollis (Haswell, 1885)

A. longicollis Flynn, 1919, 81–83, Pl. XXI, figs 16–17.

Material examined. QM-S85521, ovig. ♂, MBWS stn 5E; QM-S85501, ♀, MBWS stn 10B; QM-S85502, ♀?, MBWS stn 13B.

Remarks. This South Australian species has rarely been recorded (Haswell 1885; Clark 1963). It is distributed from South Australia to Port Jackson (type-locality) and around Tasmania, on sandy bottoms, and to depths of 6 m (Staples 1997). Of the other two *Ascorhynchus* species of South Australia (Staples 1997), *A. compactum* Clark, 1963 is, as its name suggests, compact, with a short neck; *A. longicollis* and *A. minutus* Hoek, 1881 are longitarsal species with a long neck, but the latter species has pronounced

mid-dorsal trunk tubercles and comparatively long dorsodistal tubercles on the lateral processes (all minimal or absent in *A. longicollis*), while its ocular tubercle lies halfway between the oviger insertion and the anterior margin of the cephalon, while in *A. longicollis* it is situated above the anterior edge of the oviger insertion.

Family ENDEIDAE Norman, 1908

Endeis Philippi, 1843

Endeis flaccida Calman, 1923

Endeis flaccida Calman, 1923: 295–297, fig. 17; Arango, 2003, 2759–2761, fig. 14 (literature)

Material Examined. NHM.2006.343, ♀, in *Zostera* with *Halophila ovalis* outside Amity Point sand bar, 27°24.3'S, 153°26.15'E, 0 m, 35.5‰, 85% sand, 15% silt-clay, 14.02.2005, RNB. QM-S73280, ♂, 1 juv., amongst hydroids at Shag Rock, north of Point Lookout, North Stradbroke I., 27°24.8'S 153°31.5'E, 8 m, 18.02.2005, M. Preker.

Remarks. *Endeis flaccida* has been recorded from a disjunct distribution, incorporating the Indo-West Pacific and the Caribbean, from depths between 0 and 97m. Arango (2003) was the first to record the species from Australia, amongst *Cladophora prolifera* and bryozoan/ hydroid turf on the Great Barrier Reef, at 0–2 m depth. The species is characterised by its having blind diverticula (caecae) on the gut within the legs.

Family CALLIPALLENIDAE Hilton 1942

Propallene Schimkewitsch, 1909

Propallene ardua Stock, 1975

(Fig. 2)

Propallene ardua Stock, 1975, 92–93, figs 27–41.

Material Examined. QM-S73281, ovig. ♂, clean medium sand, East of Moreton I., 27°18.19'S 153°27.56'E, 20.6 m, 22.02.2005, 0.1m² long-arm van Veen grab, RNB. QM-S73282, subadult ♀, on *Sertularella diaphana* with ectozoic *Hebella* sp., Amity Point, 27°23.9'S 153°26.2'E, 5–10 m, 14.02.2005, A-N.L.

Remarks. Stock (1975) described *Propallene ardua* from material collected in shallow waters off Tanzania, while admitting the similarity between this species, the type-species *P. longiceps* (Böhm, 1879) from Japan, and the south-east Asian species *P. kempi* (Calman, 1923). Close examination of the Moreton Bay specimens failed to find any significant difference from the description and figures of Stock (ibid.); there are nine cement-

gland tubes on the femur, two stout and distally crenulate heel spines on the slightly curved propodus, and the long setae on the longer leg articles. Observed differences include the shorter palp (Fig. 2B), a smaller, blunt dorsodistal process on oviger article five, opposite the setose apophysis (Fig. 2D), a more compact first coxa, and the absence of the 'prominence' at the base of the main claw described and figured in some detail by Stock for the Tanzanian specimens. These differences are not considered indicative of specific distinction, but probably represent population differences. The Moreton Bay specimens are figured herein to facilitate comparison with the East African type description, as well as with other Eastern Australian species. The apparent zoogeographic disparity of this record may reflect an artificial introduction via the intensive shipping at the Port of Brisbane.

Staples (1979) described the three known Australian species of *Propallene*, *P. cyathus* and *P. vagus* from south-eastern Australia (well south of Moreton Bay), and *P. saengeri* from Gladstone, Queensland (north of Moreton Bay). All of the Australian species have a compact trunk, with lateral processes separated by less than their own width. Conversely, *P. ardua* has lateral processes separated by about their own width, and its legs are significantly more hirsute than those other species, making it easily distinguished. Nakamura & Child (1983) discussed the distinctions of *P. longiceps* (Böhm 1879).

The male was carrying eggs and larvae, the latter (Fig. 2F) at a post-protonymphon stage (as appears the norm for callipallenids), 150 µm in length with short, functional chelae and two pairs of walking legs, but no trace of regressed larval legs.

Oropallene Schimkewitsch, 1929

Oropallene minjerriba sp. nov.

(Fig. 3)

Material Examined. QM-S73283, ♀ holotype, in hydroids at Shag Rock, nr Point Lookout, North Stradbroke I., 27°24.8'S 153°31.5'E, 8 m, 18.02.2005, M. Preker.

Description of Female. Trunk (Fig. 3A) compact, glabrous, fully segmented, length (anterior margin of cephalon to tip of fourth lateral process) 1.0 mm. Cephalon attenuate, half as long as total trunk length, with constricted 'neck' and flared

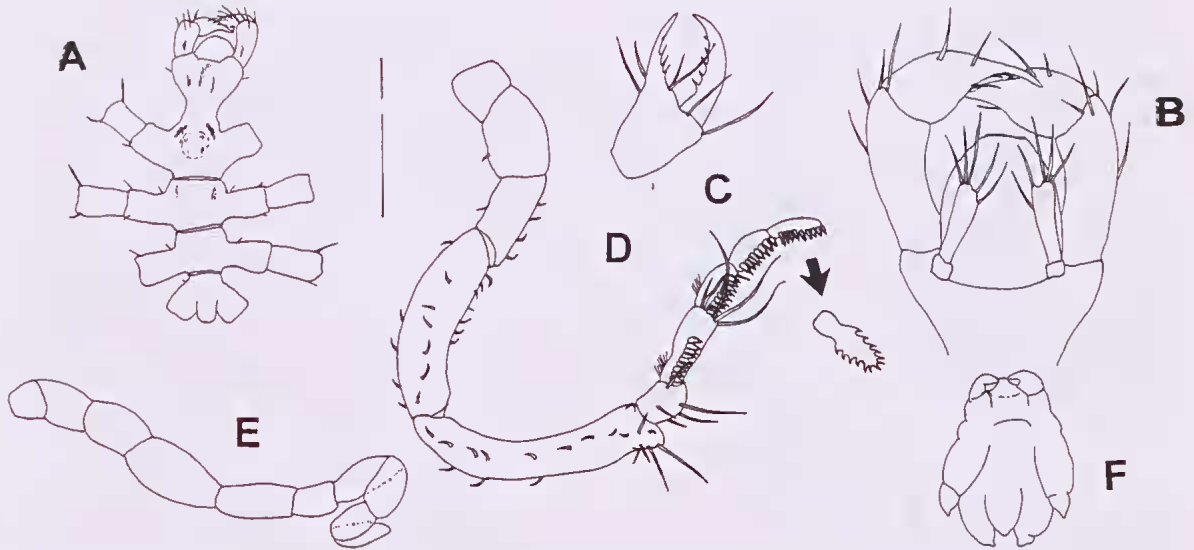


FIG. 2. *Propallene ardua* Stock, 1975, Moreton Bay specimens: A, trunk, dorsal; B, anterior appendages, ventral; C, chela; D, left oviger of male, with detail of compound spine; E, left oviger of subadult female; F, postlarva. Scale bar = 1.0 mm for A, 0.4 mm for B to E, 0.15 mm for F.

to chelifore insertion; single small spines above and just posterolateral to chelifore insertion, similar pair of single small spines antero-ventrally; ocular tubercle a rounded dome at posterior of neck, with four small pigmented eyes and two small dorsolateral tubercles. Chelifore and proboscis attachment at anterior of cephalon, oviger attachment below first lateral processes. Palps absent. Lateral processes separated by less than half of their own diameter, distally with small spines anteriorly and/or posteriorly. Abdomen simple, naked, rising above horizontal, almost reaching distal edge of lateral process of leg 4.

Proboscis short (half length of cephalon), ovoid, with simple lips. Chelifora robust; scape of one article, shorter than proboscis, with sparse distal spines (Fig. 3B); chela (Fig. 3B) typical of genus, fingers straight, fixed finger with two rows of denticulations, moveable finger with six denticulations.

Oviger (Fig. 3C) of ten articles, articles 1 to 3 (O1 to O3) short, subequal, naked; O4 and O5 subequal, longer than any other article, with single (O4) or two (O5) small distal spines; distal five articles subequal in length (O7 just longest); O6 with single simple distal spine; O7; O8, O9 and O10 with three, two, two and three ventral

compound spines respectively, O9 with small simple distal spine, O10 with short, tapering terminal claw bearing minute ventral crenulation.

Second leg (Fig. 3D) generally spinose, robust. Coxa 1 shorter than wide, with single anterior and posterior distal spines; coxa 2 1.8 times as long as coxa 1, wider distally, with scattered short spines as figured; coxa 3 half length of coxa 2, with paired ventrodorsal spines. Femur relatively stout, twice as long as wide and 4.8 times as long as coxa 3; sparse ring of small spines in proximal half, fewer similar spine subdistally, paired longer spines distally. Tibia 1 compact, 0.8 times as long as femur, with two mesial bands of small spines, longest dorsal spine on tubercle; distally with sparse short spines and longer dorsal seta. Tibia 2 longest article, 1.3 times as long as tibia 1 and 2.3 times as long as wide, with numerous short spines as figured, longer dorsal spine on tubercle in proximal half, and slender dorsal seta in distal half. Tarsus small, subtriangular, with two small and one longer, stout ventral spines. Propodus stout, twice as long as wide, without pronounced heel, with two larger proximal (heel-) spines without denticulations, five sole spines and distal sole seta; scattered small spines and three distal setae

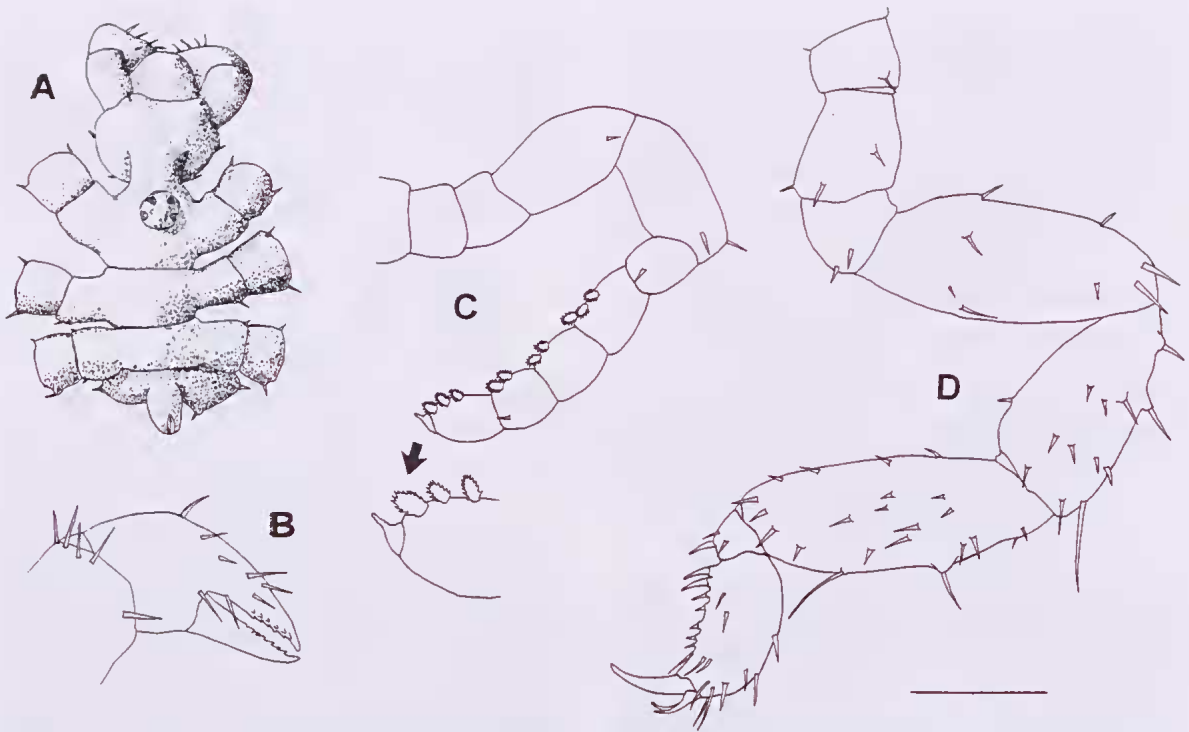


FIG. 3. *Oropallene minjerriba* sp. nov., holotype: A, trunk, dorsal (4th trunk segment deflected ventrally); B, left chela; C, left oviger with detail of spination of distal article; D, second left leg. Scale bar = 0.4 mm for A, 0.2 mm for B, C, 0.3 mm for D.

adjacent to main claw insertion. Main claw curved, 0.56 times as long as propodus, auxiliary claws curved, 0.6 times as long as main claw.

MEASUREMENTS OF HOLOTYPE (mm). Trunk length: 1.0; cephalon: 0.5; width across 2nd lateral processes: 0.54. Lengths of oviger articles 1 to 10 respectively: 0.07, 0.07, 0.07, 0.19, 0.18, 0.09, 0.10, 0.09, 0.08 and 0.09. Fourth leg, coxa 1: 0.13; coxa 2: 0.24; coxa 3: 0.12; femur: 0.58; tibia 1: 0.46; tibia 2: 0.60; tarsus: 0.07; propodus: 0.32; main claw: 0.18; auxiliary claw 0.11.

Etymology. 'Minjerriba' is an Australian aboriginal name for North Stradbroke Island, off which the holotype was collected (used as a noun in apposition).

Remarks. *Oropallene* is in part characterised by the 4-articled palp found only in the male. The only genus of the Callipallenidae without palps in the male, but with a distal oviger claw and regular denticulations on the chela fingers is *Seguapallene* (Pushkin 1975), species of which do not have a flared crop, but do have a denticulate oviger claw. Of those callipallenid taxa with male palps, the only genera with dentic-

ulate oviger spines, a terminal oviger spine and auxiliary claws are *Oropallene* and *Neopallene*.

There is some doubt over the maturity of the single known specimen of *N. antipoda* Stock, 1954 (*vide* Stock 1954: 35): if it is immature, then the mature palp structure may be more than one article, and the species may belong to *Oropallene*. The other two species of *Neopallene*, *N. campanellae* Dohrn, 1881, and *N. azorensis* Arnaud, 1974, are attenuate, slender-legged forms with an elongate oviger claw (see Arnaud 1974, for discussion). *Oropallene* species have a flared crop, two of these are compact species, with short oviger claws (three if *N. antipoda* proves to be in this genus). The present female, with its short oviger claw, compact body form and distinctively flared crop, is thus attributed to *Oropallene*, and is particularly similar to *O. minor* Clark, 1963 and the type species *O. dimorpha* (Hoek 1898) (and to no other species of any of the three genera mentioned above).

The only Australian species of *Oropallene* described previously is *O. minor*, from Victoria at

39–144 m depth (Clark 1963), to which species *O. minjerriba* sp. nov. bears much gross similarity. *Oropallene minor*, at a trunk length of 1.6 mm, was the smallest described species (hence its specific epithet); *O. minjerriba* is far smaller than *O. minor*, its leg articles are much more compact (tibia 2 six times as long as wide, propodus 3.5 times as long as wide); in addition, the present species has remarkably sparse oviger compound spines (3:2:2:3 plus terminal claw, compared with 7:6:5:5 in female of *O. minor*), the auxiliary claws are only 0.56 times the length of the main claw (two-thirds as long in *O. minor*), and denticulations are present on both chela fingers (only 'a few low callosities' on the moveable finger in *O. minor*).

Oropallene minjerriba is by far the most compact species of this genus; should the male be collected, it would be easily recognisable.

Callipallene Flynn, 1929

Callipallene emaciata (Dohrn, 1881)

(Fig. 4)

Palleue emaciata Dohrn, 1881: 193–196: pl. 14, figs 10–21.

Callipallene emaciata – Child: 1979, 41–42 (literature, discussion).

non *Callipallene emaciata* subsp. – Stock, 1954.

non *Callipallene* sp. – Clark, 1963; Bamber, 2005.

non *Callipallene* species indeterminate – Child, 1990.

Material Examined. ♂, amongst hydroids at Shag Rock, nr Point Lookout, North Stradbroke I., 27° 24.8'S 153° 31.5'E, 8 m, 18.02.2005, M. Preker (specimen lost). QM-S73284, subadult, on hydroid, Shark Gutter, 27° 07.9'S 153° 28.7'E, 15 m, 22.02.2005, M. Preker.

Remarks. The distinctions of the species within this genus remain somewhat enigmatic; they are either variable, or the subtlety of distinctions within sibling species are not well understood. The species of *Callipallene* recognised from Australian waters are *C. micracantha* Stock, 1954, *C. novaezealandiae* (Thomson 1884) (both of these were originally described as subspecies of *C. emaciata*), *C. catulus* Lee & Arango, 2003, and probably 'Callipallene species A' of Child (1975) (*q.v.*). None of these has distal crenulations on the propodal heel spines or the ventral tarsal spines, nor fine denticulation of the auxiliary claws, as shown by the present species (Fig. 4E). In addition, *C. emaciata* sensu stricto has a short 'crop' (the region of the cephalon between the ocular tubercle and the chelifore implantation),

unlike *C. micracantha* and *C. novaezealandiae*, and is without the small dorsodistal spines on the lateral-processes, or ventral spine-bearing swelling on the femur characteristic of *C. micracantha* (*vide* Staples 2004). *C. catulus* has no suture between trunk segments 3 and 4 and a quite distinctive, almost globular, trunk morphology (Lee & Arango 2003), while *Callipallene* species A of Child (1975) has very small auxiliary claws (smaller than the propodal sole spines).

Child (1990) recorded what he took to be Stock's (1954) 'subspecies' of *C. emaciata* from the Great Barrier Reef at 2 m depth, but also refrained from naming it; Stock's record was from New Zealand.

There are five species of short-necked *Callipallene* which have fine denticulation of the auxiliary claws: Child (1988) discusses the other four, viz. *C. californiensis* (Hall 1913), *C. pectinata* (Calman 1923), *C. panamensis* Child, 1979 and *C. seychellensis* Child, 1988.

It seems highly improbable that all the material attributed to this species from the Mediterranean (type locality is the Gulf of Naples), northwestern Europe (northeastern Atlantic), the Caribbean, the Gulf of Mexico and now eastern Australia represents a single species. However, I can see no evident features which distinguish the present material from Dohrn's species.

Pseudopallene Wilson, 1878

Pseudopallene reflexa (Stock, 1968)

Spasmopallene reflexa Stock, 1968, 40–42, fig. 15.

Pseudopallene reflexa – Staples, 2004, 164–166, fig. 4.

Material Examined. QM-S73285, ovigerous ♂, ♀, subadult, NHM.2006.344–345, larvigerous ♂, 1 subadult in ethanol, on the bryozoan *Orthoscuticella ventricosa* agg, Henderson's Pinnacles, East side of Moreton I., 27° 07.901'S 153° 28.712'E, 22–26 m, 22.02.2005, A-N. L.

Remarks. The long-standing confusion over the Antipodean representatives of this genus, together with the genera *Spasmopallene* and *Pallenella*, has been recently and competently resolved by Staples (2004), who presented a key to the Australian species of *Pseudopallene*, of which the other two genera are junior synonyms. *Pseudopallene dubia* Clark, 1963, was returned to its original genus, and *Spasmopallene reflexa* and *Pallenella laevis* (Hoek 1881) were moved to *Pseudo-*

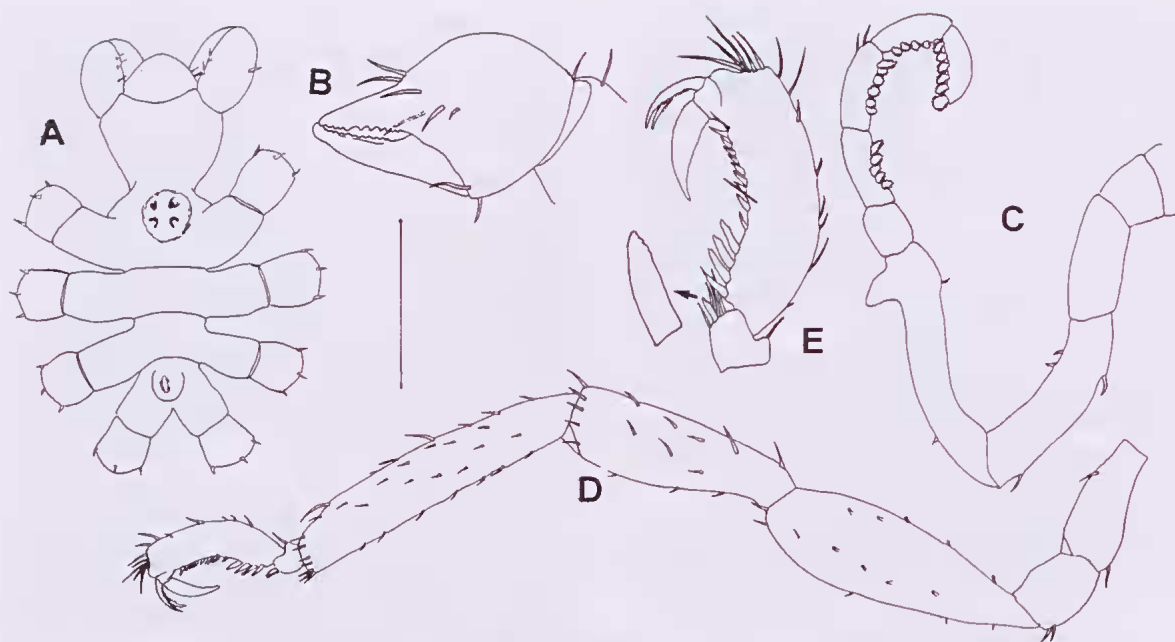


FIG. 4. *Callipallene emaciata* (Dohrn, 1881), Moreton Bay specimen: A, trunk, dorsal; B, chela; C, oviger; D, third leg; E, distal articles of third leg, with detail of tarsus spine. Scale bar = 0.4 mm for A, D, 0.2 mm for B, C and E.

pallene. Bamber (2005) synonymised *S. clarki* with *P. dubia*.

The present material has the distinct serrated oviger claw of *P. reflexa* as well as the characteristic heel-spine configuration of two basal spines, eight spines in two parallel rows of four each, and one distal spine. The Moreton Bay specimens differ from those described by Staples (*ibid*) from South Australia in that the longer leg articles are without the irregular surface of low swellings; nor are they as compact as those of the holotype (Stock 1968). Staples' material was also collected from one of the four taxa within *Orthoscuticella ventricosa* agg., and, as with the present material, had taken on the exact colouration of the bryozoan.

Family PHOXICHILIDIIDAE Sars, 1891

Anoplodactylus Wilson, 1878

Anoplodactylus cribellatus Calman, 1923

A. cribellatus Calman, 1923: 285–287, fig. 12; Bamber, 1997: 46–49, fig. 2 (synonymy); *A. simplex* Clark, 1963: 50–51, fig. 25.

Material examined. QM-S85526, subadult ♂, MBWS stn 3A; QM-S85509, ovig. ♂, MBWS stn 3B; QM-S85505,

♀, MBWS stn 3C; QM-S85524, ♂, MBWS stn 3E; QM-S85518, ovig. ♂, MBWS stn 4C.

Remarks. Bamber (1997) investigated the three described species of *Anoplodactylus* with more than 10 cement-gland pores per femur in the male, and concluded that the Australian *A. simplex* Clark, 1963 and the Japanese *A. perforatus* Nakamura & Child, 1982, were synonymous with Calman's species, described originally from Indian waters. Previous Australian records are from Townsville, Qld, Botany Bay, NSW, and Esperance, WA, and at depths from 0–30 m. It is readily distinguished from the only other *Anoplodactylus* species recorded in Moreton Bay (*A. tubiferus*, see below), as it has a low, dome-like ocular tubercle (see Arango, 2003, for key to Australian species of *Anoplodactylus*).

Anoplodactylus tubiferus (Haswell, 1885)

Anoplodactylus tubiferus — Staples, 1982: 457, fig. 2 (literature, synonymy); Müller, 1989: 281–282, figs 15–20.

Material examined. QM-S85516, ♀, MBWS stn 1B; QM-S85527, 2 ♂♂, ♀ MBWS stn 1C; QM-S85528, ♀, MBWS stn 1E; QM-S85507, ♀, MBWS stn 2E; QM-S85518, S85520, 2 ♀♀, MBWS stn 3E; QM-S85528, 2 ♂♂, MBWS stn 5B; QM-S85506, ♂, ♀, MBWS stn 5E.

Remarks. This species, with a characteristically tall, slender ocular tubercle, has a wide distribution around the Indo-West Pacific (see Müller 1989), in depths from the subtidal to 135 m. In Australia it has been recorded previously from the Great Barrier Reef, Qld, Victoria, NSW, and WA.

Family NYMPHONIDAE Wilson, 1878

Nymphon Fabricius, 1794

Nymphon mollerii Clark, 1963

Nymphon mollerii Clark, 1963: 10–12, fig. 6.

Material examined. ♀, MBWS stn 3C (det. C. Arango).

Remarks. This species is only known from Australia — from the Great Barrier Reef, Qld, to South Australia and the Great Australian Bight, at depths of 5–112 m. It has a long neck, chela fingers longer than the palm, a short tarsus and short claws on the propodus.

Nymphon boogoorah sp. nov.

(Fig. 5)

Material examined. HOLOTYPE: QM-S85514, ♀, MBWS stn 2D. PARATYPES: QM-S85517, ♀, MBWS stn 2E; QM-S85504, ♀, MBWS stn 5E. OTHER MATERIAL: 1 spec., MBWS stn 4E; 1 spec., MBWS stn 10D (det. C. Arango).

Description of Female. Small nymphonid, holotype trunk length 1.7 mm; trunk (Fig. 5A, B) not compact, glabrous, fully segmented. Cephalon 0.43 times as long as total trunk length, without ornamentation, with appearance of ‘crop’ but no parallel-sided neck region; dome-like ocular tubercle in centre of cephalon, with four eyes; oviger attachment below anterior margin of first lateral processes. Lateral processes naked, separated by more than their own diameter. Abdomen simple, clavate, almost horizontal, nearly reaching distal edge of coxa 1 of leg 4.

Proboscis (Fig. 5B) barrel-shaped, naked, directed anteroventrally, 0.3 times as long as trunk.

Chelifore scape of one article, slender, two-thirds as long as proboscis; chela (Fig. 5C) slender, fingers twice as long as palm; moveable finger with 16 pointed, curved teeth; fixed finger with 17 blunt, curved teeth.

Palp (Fig. 5D) of 5 articles. First article (P1) short, compact; P2 and P3 elongate, P3 0.8 times as long as P2; P4 just shorter than P5, these two together 0.9 times as long as P3. P4 and P5 densely setose.

Oviger (Fig. 5E, F) of 10 articles, article 5 (O5) longest; articulations between O2 and O3 and between O4 and O5 anaxial; O7 to 10 setose, with compound spines in the formula 8:5:4:5 (proximal spine on O7 without lateral denticulations); terminal claw with five ventral teeth.

Third leg (Fig. 5G) elongate, slender. Coxa 1 compact, naked; coxa 2 more than three-times as long as coxa 1, with single ventrodistal gonadopore; coxa 3 0.4 times as long as coxa 2; femur 1.6 times as long as coxa 2, finely setose, dorsodistally with longer seta. Tibia 1 1.3 times as long as femur, slender, sparsely setose; tibia 2 longest article, 1.1 times as long as tibia 2, slender, with robust ventrodistal curved spine. Tarsus slender, elongate, with short ventral setae, 0.8 times as long as propodus. Propodus slender, elongate, with short ventral setae, without heel; main claw half length of propodus; auxiliary claws conspicuous, slender, 0.8 times length of main claw.

Male unknown.

MEASUREMENTS OF HOLOTYPE FEMALE (mm). Trunk length: 1.70; cephalon: 0.73; width across 2nd lateral processes: 0.94; abdomen length: 0.27; proboscis length: 0.52. Lengths of palp articles 1 to 5 respectively: 0.04; 0.44; 0.36; 0.14; 0.16. Lengths of oviger articles 1 to 10 respectively: 0.09; 0.20; 0.20; 0.57; 0.63; 0.34; 0.21; 0.16; 0.14; 0.14. Third leg, coxa 1: 0.28; coxa 2: 1.00; coxa 3: 0.37; femur: 1.66; tibia 1: 2.11; tibia 2: 2.34; tarsus: 0.49; propodus: 0.63; main claw: 0.31; auxiliary claw: 0.25.

Etymology. *Boogoorah* is an Australian aboriginal name for Moreton Bay.

Remarks. Eleven shallow-water (<200 m) *Nymphon* species have been recorded from Australia. Clark (1963) listed six species, *N. aequidigitatum* Haswell, 1884, *N. inunane* Stock, 1954, *N. singulare* Stock, 1954, *N. mollerii* (see above), *N. novaehollandiae* Clark, 1963, and *N. bunyipii* Clark, 1963. Subsequently Stock (1973a) described *N. couirostrum* and *N. dubitabile* as new species from south-eastern Australia; Child (1975) described two new species from Western Australia, subsequently synonymised to one species (*N. rottnești* Child, 1975) by Bamber (2005); Child (1990) described *N. draconis* from the Great Barrier Reef, and Arango (2003) recorded *N. micronesicum* Child, 1982, also on the Great Barrier Reef.

The present species, with no lateral process tubercles, lateral processes separated by more

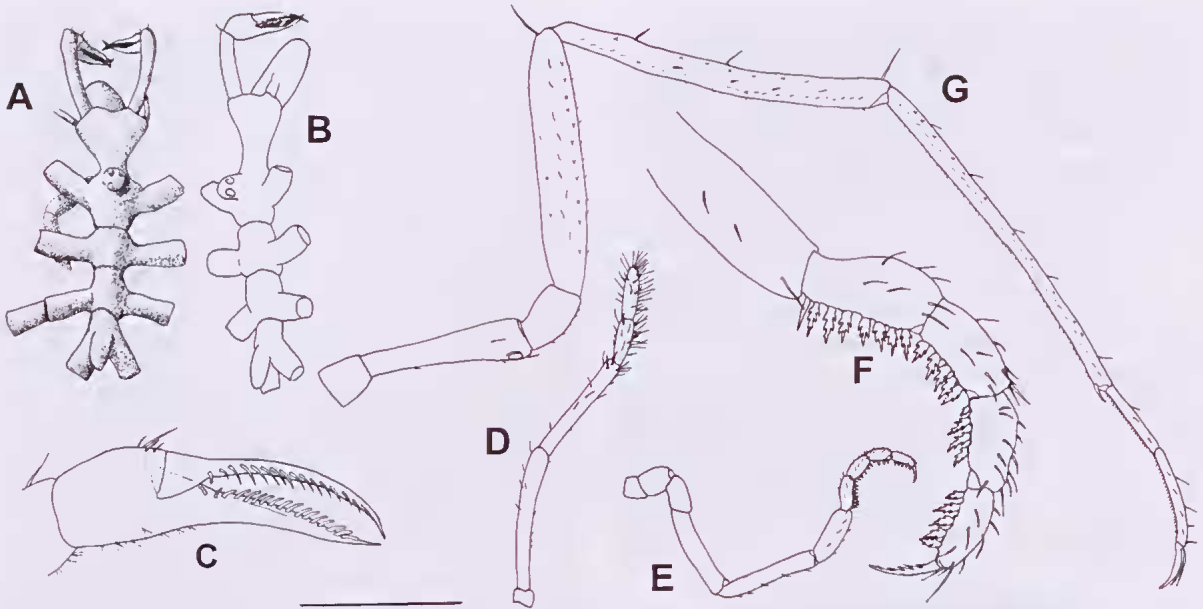


FIG. 5. *Nymphon boogoora* sp. nov., holotype: A, trunk, dorsal; B, trunk, dorsolateral; C, right chela; D, right palp; E, right oviger; F, detail of distal oviger articles; G, third right leg. Scale bar = 1 mm for A, B, E and G, 0.25 mm for C, F, 0.5 mm for D.

than their own diameter, auxiliary claws shorter than the main claw, and a slender tarsus more than half as long as the propodus, both with simple ventral setation, is similar only to *N. rotnesti* and *N. molleri*. Unlike *N. boogoora* sp. nov., both of those species have a distinct, narrow, parallel-sided neck region to the cephalon between the ocular tubercle and the flaring of the crop to the point of insertion of palps and chelifore; in addition, they have more compound spines on the oviger strigilis, and the fifth palp article is shorter than the fourth (just longer in the present species). The curved ventrodiscal spine on tibia 2 in *N. boogoora* is not found in the other species.

The only shallow-water species from New Zealand is *N. maoriana* Clark, 1958, a larger species with a similar trunk conformation, but with quite different morphology of the chela and palp, and auxiliary claws less than half the length of the main claw (*inter alia*).

Staples (1997) gave a key to the six *Nymphon* species of southern Australia, which is expanded below to cover the twelve species now recorded from Australian waters of <200 m depth.

Key to Australian species of *Nymphon* (<200 m depth)

1. Lateral processes with dorsodistal tubercles; cephalon over chelifore bases and coxae with or without tubercles. 10
 - Lateral processes, cephalon over chelifore bases and coxae without dorsodistal tubercles. 2
2. Oviger attachment distinctly separated from and anterior of first lateral processes. . . . 3
 - Oviger attachment in contact with first lateral processes. 6
3. Auxiliary claws as long as or longer than main claw (*N. aequidigitatus*-group); fifth palp article more than twice as long as fourth; tarsus about half or less as long as propodus; proboscis swollen at midlength. 4
 - Auxiliary claws less than half length of main claw; fifth palp article shorter than fourth; tarsus three-quarters as long as propodus; proboscis cylindrical. *N. buuyipi*
4. Tarsus half as long as propodus; main and auxiliary claws without denticulation; palp articles 3 and 5 subequal in length. 5
 - Tarsus much less than half length of propodus; main and auxiliary claws with proximo-

- ventral denticulations; palp article 3 much shorter than article 5. . . . *N. micronesicum*
5. Fifth palp article three times as long as fourth; chela fingers more than half length of palm; setae on distal palp and oviger articles shorter than article width.
 *N. aequidigitatum*
- Fifth palp article about twice as long as fourth; chela palm bulbous, 1.5 times as long as wide, fingers half length of palm; setae on distal palp and oviger articles longer than article width. *N. draconis*
6. Lateral processes separated by more than their own diameter; proboscis cylindrical. 7
- Lateral processes separated by about half their own diameter; proboscis conical; cephalon compact, neck broad. . . *N. conirostrum*
7. Tarsus longer than propodus, propodus with long proximal sole spines. . . . *N. dubitabile*
- Tarsus 0.8 times or less as long as propodus, propodus with no long sole spines. 8
8. Cephalon with distinct, slender, parallel-sided neck region; palp article 4 longer than article 5; distal three oviger articles with at least 8 compound spines. 9
- Cephalon without parallel-sided neck region; palp article 4 just shorter than article 5; distal three oviger articles with less than 6 compound spines. *N. boogoora*
9. Cephalon neck narrower than proboscis and half length of cephalon; terminal oviger claw distally rounded and crenulate; chela fingers 1.5 times as long as palm (eastern and Southeastern Australia). . . . *N. molleri*
- Cephalon neck one-third or less length of cephalon; terminal oviger claw distally pointed; chela fingers twice as long as palm (Western Australia). *N. rotnesti*
10. Coxa 1 with conspicuous dorsodistal tubercles; no tubercles over chelifore bases.
 *N. novaeollandiae*
- Anterior cephalon at chelifore insertion with low, rounded single tubercles; coxae without dorsodistal tubercles. 11
11. Lateral processes separated by about their own diameter; palp articles 4 and 5 subequal in length, together as long as third article; twice as many and finer teeth on fixed finger of chela than on moveable finger (teeth dimorphic). *N. immane*

- Lateral processes hardly separated from each other; palp article 5 much shorter than article 4, these two together longer than article 3; similar teeth on both chela fingers (monomorphic). *N. singlarie*

ACKNOWLEDGEMENTS

I am very grateful to Dr Anne-Nina Lörz (NIWA) and Dr Miriam Preker for collecting specimens for me, to Dr John Taylor and Dr Emily Glover (NHM), Ian Brown (Australian Marine Sciences Association, AMSA) and the crew of R.V. *Tom Marshall* for outstanding field assistance and entertainment, to Dr Julie Phillips (University of Queensland) for algal identifications, to Mary Spencer-Jones (NHM) for bryozoan identifications, to Claudia Arango (Queensland Museum) for her initial determinations of the MBWS survey material, and most of all to Peter Davie (AMSA, Queensland Museum) for arranging the 2005 Moreton Bay Workshop and inviting my participation, and all those responsible for the logistics and thus smooth running of the Workshop.

LITERATURE CITED

Arango, C.P. 2003. Sea spiders (Pycnogonida, Arthropoda) from the Great Barrier Reef, Australia: new species, new records and ecological annotations. *Journal of Natural History* 37: 2723–2772.

Arnaud, F. 1974. Pycnogonides recoltés aux Açores par les campagnes 1969 et Biacores 1971. *Bulletin Zoologisch Museum, Universiteit van Amsterdam* 3: 169–187.

Arnaud, F. & Bamber, R.N. 1987. The Biology of Pycnogonida. *Advances in Marine Biology* 24: 1–96.

Bamber, R.N. 1997. Two pycnogonids (Arthropoda) from the Coral Sea Region: a new *Callipallene* and a reassessment of the *Anoplodactylus cribellatus* complex. *Species Diversity* 2: 43–50.

2004. Two new pycnogonids (Arthropoda: Pycnogonida) from Atlantic Equatorial Africa. *Species Diversity* 9: 125–133.

2005. Pycnogonids (Arthropoda: Pycnogonida) from the Recherche Archipelago, Esperance, Western Australia, Australia. Pp. 325–343. In, Wells, F.E., Walker, D.I. & Kendrick, G.A. (Eds), *Proceedings of the Twelfth International Marine Biological Workshop: The Marine Flora and Fauna of Esperance, Western Australia*. (Western Australian Museum, Perth).

2007. A holistic re-interpretation of the phylogeny of the Pycnogonida Latreille, 1810 (Arthropoda). In, Zhang, Z.-Q & Shear, W.A. (Eds), *Linnean Tercent-*

- tenary. Progress in invertebrate taxonomy. *Zootaxa* 1668: 295–312.
- Böhm, R. 1879. Ueber zwei neue von Herrn Dr. Hilgendorf in Japan gesammelte Pycnogoniden. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 1879 (4): 53–60.
- Calman, W.T. 1923. Pycnogonida of the Indian Museum. *Records of the Indian Museum*, 25 (3): 265–299.
- Child, C.A. 1975. Pycnogonida of Western Australia. *Smithsonian Contributions to Zoology* 190: 1–28.
1979. Shallow-Water Pycnogonida of the Isthmus of Panama and the Coasts of Middle America. *Smithsonian Contributions to Zoology* 293: i-v + 1–86.
1988. Pycnogonida from Aldabra Atoll. *Bulletin of the the Biological Society of Washington* 8: 45–78.
1990. Pycnogonida of the Western Pacific Islands VIII. Recent collections from islands of the Great Barrier Reef, Australia. *Proceedings of the Biological Society of Washington* 103 (2): 311–335.
- Clark, W.C. 1963. Australian Pycnogonida. *Records of the Australian Museum* 26: 1–81.
1971. Pycnogonida of the Snares Islands. *New Zealand Journal of Marine and Freshwater Research* 5: 329–341.
- Dohrn, A. 1881. Die Pantopoden des Golfes von Neapel und der angrenzenden Meeresabschnitte. *Monographie der Fauna und Flora des Golfes von Neapel* 3: 1–252, pls I–XVIII.
- Flynn, T.T. 1919. A re-examination of Professor Haswell's types of Australian Pycnogonida. *Papers & Proceedings of the Royal Society of Tasmania* 1919: 70–92; Pls XVIII–XXII.
- Fry, W.G. & Hedgpeth, J.W. 1969. Pycnogonida, 1. Colossendeidae, Pycnogonidae, Endeidae, Ammothidae. Fauna of the Ross Sea, 7. *Memoirs of the New Zealand Oceanographic Institute* 49: 1–139.
- Hall, H.V.M. 1913. Pycnogonida from the coast of California with descriptions of two new species. *University of California Publications in Zoology* 11(6): 127–142, pls 3, 4.
- Haswell, W.A. 1884. On the Pycnogonida of the Australian coast with descriptions of new species. *Proceedings of the Linnean Society of New South Wales* 9: 1021–1033, pls LIV–LVII.
- Hoek, P.P.C. 1881. Report on the Pycnogonida dredged by HMS Challenger 1873–76. *Reports of the Scientific Results of the Exploring Voyage of HMS Challenger* 3 (10): 1–167, 21 pls.
1898. On four pycnogonids dredged during the cruise of the Challenger (investigated and described after the completion of the report). With an appendix. *Tijdschrift der Nederlandsche Dierkundige Vereeniging* (2) 5 (2–4): 290–301.
- Lee, A.C. & Arango, C.P. 2003. Two new species and other records of sea spiders (Pycnogonida: Arthropoda) from tropical north Queensland. *Memoirs of the Queensland Museum* 49: 343–348.
- Müller, H-G. 1989. Pycnogonida from the Gulf of Aden, Northern Indian Ocean. *Seuckenberiana Maritima* 20: 277–290.
- Nakamura, K. & Child, C.A. 1983. Shallow-Water Pycnogonida from the Izu Peninsula, Japan. *Smithsonian Contributions to Zoology* 386: 1–71.
- Staples, D.A. 1979. Three new species of *Propallene* (Pycnogonida: Callipallenidae) from Australian waters. *Transactions of the Royal Society of Australia* 103: 85–93.
1982. Pycnogonida of the Calliope River and Auckland Creek, Queensland. *Memoirs of the Queensland Museum* 20: 455–471.
1997. Sea Spiders or Pycnogonids (Phylum Arthropoda). Pp. 1040–1072, pls 67–68. In, Shepherd, S.A. & Davies, M. (Eds), *Marine Invertebrates of Southern Australia*, Part III. (South Australian Research and Development Institute, Richmond, S.A.).
2004. Pycnogonida from the Althorpe Islands, South Australia. *Transactions of the Royal Society of South Australia* 129: 158–169.
- Stock, J.H. 1954. Papers from Dr Mortensen's Pacific Expedition. 1914–1916. LXXVII, Pycnogonida from the Indo-West Pacific, Australian and New Zealand waters. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn* 116: 1–168.
1968. Pycnogonida collected by the Galathea and Anton Bruun in the Indian and Pacific Oceans. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn* 131: 7–65.
- 1973a. Pycnogonida from south-eastern Australia. *Beaufortia* 20: 99–127.
- 1973b. *Achelia shepherdii* n. sp. and other Pycnogonida from Australia. *Beaufortia* 21: 91–97.
1975. The pycnogonid genus *Propallene* Schimke-witsch, 1909. *Bulletin Zoologisch Museum, Universiteit van Amsterdam* 4: 89–97.
- Thomson, G.M. 1884. On the New Zealand Pycnogonida, with descriptions of new species. *Transactions & Proceedings of the New Zealand Institute* 16 (1883): 242–248, pls XIV–XVI.